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SPECIAL ANALYSIS K

RESEARCH AND DEVELOPMENT

The Budget of the United States Government, 1983

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OFFICE OF MANAGEMENT AND BUDGET

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SPECIAL ANALYSIS K

RESEARCH AND DEVELOPMENT

This analysis summarizes the funding of research and development across all departments and agencies. It consists of two parts. The first highlights the R. & D. policies and trends in the 1983 budget. The second describes in more detail the R. & D. programs of the 13 agencies whose 1983 obligations account for over 99% of total Federal funding for R. & D.

The Federal Government does not have a separate R. & D. budget. Rather, R. & D. programs are reviewed and funded primarily in the context of the missions of individual agencies and on the basis of their importance in meeting mission objectives.

PART I. HIGHLIGHTS

R. & D. activities are supported by the Federal Government in two broad categories, namely, to meet:

- Federal Government needs—where the sole or primary user of the R. & D. is the Government itself, for example, in national defense and environmental regulation.
- National needs—where the Federal Government helps to assure the strength of the Nation's economy and the welfare of its citizens through the support of R. & D. in specific areas such as agriculture, energy, and health.

The 1983 budget reflects a clearer delineation, than has been the case in the past, between the responsibilities of the Federal Government and those of the private sector with respect to R. & D. to help meet national needs.

The Federal Government has two main responsibilities with respect to R. & D. to meet national needs.

- First, it should provide a climate for technological innovation which encourages private sector R. & D. investment that best reflects the realities of the marketplace where new and improved processes and products are developed, bought, and sold. The administration is fulfilling this responsibility primarily by reducing Government spending, regulation and taxes. Thus, the administration's R. & D. policy is part of its overall economic policy.
- Second, the Government should focus its direct R. & D. support on those areas where there is substantial prospect for significant economic gain to the Nation, but where the pri-

vate sector is unlikely to invest adequately in the national interest because the benefits, in large measure, are not immediately "appropriable" by individual firms. Thus, for example, the Federal Government supports basic research across all scientific disciplines but limits its spending on technology development to technologies requiring a long period of initial development, such as fusion power, where the risk is high but the payoff to the Nation is potentially large. This strategy is reflected in the funding for R. & D. to meet national needs in the 1983 budget.

Total obligations and outlays for the conduct of all Federal R. & D. programs and for related facilities are shown in table K–1 below.

Table K–1. TOTAL FEDERAL FUNDING FOR CONDUCT OF R. & D. AND RELATED FACILITIES

(In billions of dollars)

	Obligations			Outlays		
	1981 actual	1982 estimate	1983 estimate	1981 actual	1982 estimate	1983 estimate
Conduct of R. & D.	35.0	38.8	43.0	34.3	37.4	41.1
R. & D. facilities	1.5	1.5	1.3	1.6	1.7	1.2
Total	36.5	40.4	44.3	35.9	39.1	42.3

CONDUCT OF RESEARCH AND DEVELOPMENT

The 1983 budget includes $43.0 billion in obligations for the conduct of R. & D., an increase of $4.2 billion over 1982, largely in the R. & D. programs of the Department of Defense. Smaller but significant increases are also proposed for the R. & D. programs of a number of agencies including the National Aeronautics and Space Administration, the Department of Health and Human Services and the National Science Foundation. A major further decrease is proposed in 1983 in Federal support of energy R. & D. to be funded through the proposed Energy Research and Technology Administration within the Department of Commerce. Included within the total funding for the conduct of R. & D. is support for the conduct of basic research, but not the funding for R. & D. facilities, which is reported separately in this analysis.

Highlights of the programs of major R. & D. agencies that account for 94% of the proposed obligations for the conduct of R. & D. by all agencies are presented below:

- ***Department of Defense (DOD).***—Obligations for the conduct of R. & D. by DOD will rise to $24.5 billion, an increase of $3.9 billion over 1982; this represents 57% of the total Federal funding for R. & D. In 1983, the Department will provide increased support for basic research and for R. & D. related to

the development of advanced strategic systems, such as bombers, ballistic missiles and ballistic missile defense.

- ***National Aeronautics and Space Administration (NASA).***—Obligations for the conduct of R. & D. by NASA are estimated at $6.5 billion for 1983, $0.7 billion over 1982. Increased funding for 1983 is proposed to assure timely transition of the Space Shuttle to an operational system and to continue the highest priority research and space exploration projects, including the further development of the Space Telescope, Gamma-Ray Observatory and the Galileo Mission to Jupiter.
- ***Department of Commerce (DOC).***—Obligations by this Department for the conduct of R. & D. would be $4.2 billion in 1983, $0.6 billion below 1982. Included in the 1983 total amount is $3.9 billion for programs transferred to the Department as part of the proposed dismantlement of the Department of Energy. This represents a net decrease of $0.6 billion for these programs but includes increases for nuclear weapons R. & D. and for long-term research in energy sciences and fundamental physics. These increases are more than offset by eliminating subsidies to industry for near-term energy research and

Table K-2 summarizes Federal support for the conduct of R. & D. by agency.

Table K-2. **CONDUCT OF RESEARCH AND DEVELOPMENT BY MAJOR DEPARTMENTS AND AGENCIES**

(In millions of dollars)

Department or agency	Obligations			Outlays		
	1981 actual	1982 estimate	1983 estimate	1981 actual	1982 estimate	1983 estimate
Defense-military functions	16,494	20,553	24,469	15,720	18,784	22,673
National Aeronautics and Space Administration	5,407	5,841	6,513	5,279	5,696	6,460
Commerce	5,276	4,793	4,157	5,466	5,240	4,352
(Energy Research and Technology Administration)	(4,948)	(4,522)	(3,917)	(5,121)	(4,948)	(4,104)
Health and Human Services	3,973	3,972	4,122	3,991	3,935	4,039
(National Institutes of Health)	(3,332)	(3,427)	(3,533)	(3,350)	(3,390)	(3,487)
National Science Foundation	964	961	1,033	892	1,018	908
Agriculture	773	807	838	742	805	824
Interior	424	397	371	438	402	380
Transportation	420	329	366	418	321	316
Environmental Protection Agency	326	317	230	344	335	274
Nuclear Regulatory Commission	227	223	220	211	209	206
Agency for International Development	156	160	186	151	157	159
Veterans Administration	147	137	145	138	130	140
Education	91	74	76	96	94	112
All other [1]	354	279	272	366	298	280
Total conduct of R. & D.	**35,033**	**38,843**	**42,997**	**34,252**	**37,425**	**41,122**

[1] Includes the Departments of Housing and Urban Development, Justice, Labor, Treasury, and State, the Tennessee Valley Authority, the Smithsonian Institution, the Corps of Engineers, the Federal Emergency Management Agency, the U.S. Office of Personnel Management, the Library of Congress, the Arms Control and Disarmament Agency, the Federal Communications Commission, the Advisory Committee on Intergovernmental Relations, and the Federal Trade Commission.

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technology development. The other R. & D. programs of the Department of Commerce, such as metrology and oceanic, marine and atmospheric research, would be reduced by $31 million below 1982, to a level of $240 million in 1983.

- ***Department of Health and Human Services (HHS).***—Obligations for the conduct of R. & D. in HHS are estimated to total $4.1 billion in 1983, $150 million above 1982, of which the National Institutes of Health (NIH) accounts for about $3.5 billion, $106 million above 1982. The 1983 budget for NIH continues to support a strong national effort in biomedical research, including research related to potentially hazardous occupational and environmental exposures.
- ***National Science Foundation (NSF).***—Obligations for the conduct of R. & D. by NSF are estimated to total $1,033 million in 1983, an increase of $72 million over 1982. Included in the total is $984 million for the support of basic research, an increase of $72 million over 1982. The 1983 budget for NSF proposes increased support of research in the natural sciences and engineering and selected retrenchment in relatively lower priority programs.

CONDUCT OF BASIC RESEARCH

Support for the conduct of basic research is included within the overall funding for the conduct of R. & D. Obligations for the conduct of basic research are estimated to increase in 1983 by $0.5 to $5.8 billion or 9% over 1982.

The 1983 budget recognizes the need to maintain a strong national research effort in all scientific disciplines. Basic research in such fields as chemistry, physics, biology, materials, oceanography, and earth sciences provides the underpinning, for example, for advances in health care, improved nutrition and agricultural production, and new technologies for defense, space and energy.

The allocation of funds in the 1983 budget provides for the further strengthening of basic research in specific areas of Government responsibility such as defense and space. Special emphasis is also being given, in the national interest, to strengthening basic research in the physical sciences and engineering as exemplified in programs of the new Energy Research and Technology Administration in the Department of Commerce and the National Science Foundation. Such areas of research are of particular importance to long-term industrial productivity and economic growth.

The increase in basic research support will particularly encourage scientists at the Nation's colleges and universities in their efforts to advance the frontiers of knowledge and thereby also aid in the training of future scientists and engineers. About one-half of the total Federal obligations for basic research are made to support

researchers in universities and colleges who conduct about one-half of all basic research performed in the Nation.

Table K-3 summarizes Federal support for the conduct of basic research by agency.

Table K-3. CONDUCT OF BASIC RESEARCH BY MAJOR DEPARTMENTS AND AGENCIES

(In millions of dollars) [1]

Department or agency	Obligations			Outlays		
	1981 actual	1982 estimate	1983 estimate	1981 actual	1982 estimate	1983 estimate
Health and Human Services	1,955	2,000	2,069	1,944	1,978	2,034
(National Institutes of Health)	(1,767)	(1,839)	(1,897)	(1,750)	(1,813)	(1,869)
National Science Foundation	898	912	984	830	972	861
Defense-military functions	603	673	781	554	616	712
Commerce	608	665	762	614	670	759
(Energy Research and Technology Administration)	(591)	(647)	(741)	(597)	(652)	(737)
National Aeronautics and Space Administration	532	580	682	538	575	661
Agriculture	314	332	359	302	337	354
Interior	80	73	68	79	73	69
Smithsonian Institution	44	45	51	41	44	51
Veterans Administration	15	13	14	15	13	14
Education	17	14	14	18	18	22
Environmental Protection Agency	10	15	10	12	12	10
All other [2]	32	27	28	29	29	28
Total	**5,108**	**5,348**	**5,821**	**4,975**	**5,337**	**5,574**

[1] Amounts reported in this Table are included in Totals for conduct of R. & D.
[2] Includes the Departments of Justice, Transportation, Treasury and Labor, the Tennessee Valley Authority, the Corps of Engineers, the Federal Trade Commission, the Library of Congress, and the Agency for International Development.

R. & D. FACILITIES

The successful conduct of R. & D. is dependent on the quality of instrumentation and facilities that are available to the research community. A significant amount of funding for equipment and instrumentation is included, but not separately identified, in the funding for the conduct of R. & D. Funds separately identified for R. & D. facilities by Federal Government agencies are summarized in table K-4.

Obligations for R. & D. facilities in 1983, including the construction or renovation of facilities and the acquisition of major equipment, will amount to $1.3 billion, $265 million below 1982.

Significant changes in R. & D. facilities support are being proposed in 1983, primarily for programs that are being transferred to the Department of Commerce, as part of the proposed dismantlement of the Department of Energy. In these programs in 1983, support will be maintained generally for basic research facilities, such as those for high energy physics research. However, significant reductions are proposed for facilities related to the demonstration of energy technologies, largely in keeping with the policy of

relying more on industry investment. The 1982 budget includes funds to bring many energy demonstrations to an orderly close or to assist industry in taking over the support of these facilities.

Table K-4. RESEARCH AND DEVELOPMENT FACILITIES BY MAJOR DEPARTMENTS AND AGENCIES

(In millions of dollars)

Department or agency	Obligations			Outlays		
	1981 actual	1982 estimate	1983 estimate	1981 actual	1982 estimate	1983 estimate
Commerce	982	964	681	1,112	1,191	644
(Energy Research and Technology Administration)	(981)	(955)	(678)	(1,111)	(1,184)	(640)
Defense-military functions	278	285	366	238	248	320
National Aeronautics and Space Administration	114	143	116	147	135	122
Agriculture	21	35	30	39	39	34
Health and Human Services	25	62	20	43	35	38
(National Institutes of Health)	(23)	(18)	(20)	(42)	(32)	(28)
National Science Foundation	13	10	16	13	10	15
All other [1]	47	28	33	35	43	25
Total	1,480	1,526	1,262	1,627	1,702	1,198

[1] Includes the Departments of the Interior, Transportation, and Treasury, the Veterans Administration, the Tennessee Valley Authority, the Agency for International Development, and the Smithsonian Institution.

Part II. Agency R. & D. Programs

Presented below are summaries of the R. & D. activities of the 13 agencies that support more than 99% of Federally funded R. & D.

DEPARTMENT OF DEFENSE

The primary purpose of the Defense R. & D. program is to develop new strategic and tactical weapons and supporting systems to improve the Nation's defense. In 1983, DOD obligations for the conduct of R. & D. will increase by $3.9 billion to $24.5 billion, which represents over one-half of total Federal funding for research and development in 1983. Within the total funding by DOD for the conduct of R. & D., funding of basic research will increase from $673 million in 1982 to $781 million in 1983. Funding for R. & D. facilities will increase by $81 million in 1983 to a total of $366 million. By mission category, major R. & D. efforts for 1983 include:

Technology Base and Advanced Technology Development.—There will be substantial real growth in DOD support of these areas, above the 1982 level, to investigate promising new technologies and to avoid technological surprise. Current thrusts in very high speed

integrated circuits and guided munitions capable of being operated in adverse weather will continue. Increased emphasis will be given to new technologies that offer significant opportunities to increase the effectiveness of existing military forces, such as improved information processing, better materials, and improved sensors. Other programs include work on electronic devices that will continue to operate when parts malfunction, electronics that are resistant to various types of radiation, advanced computer languages and methods of computing high-power lasers and advanced composite materials.

Strategic Programs.—The budget provides significant increases in this area for the accelerated development of ballistic missile defense, as well as the exploration of future options for MX basing—either deep underground or in continuous patrol aircraft. In addition, development efforts continue on an anti-satellite system and an advanced technology bomber. Development of the communications and control systems needed to support strategic weapons will receive increased emphasis.

Tactical Programs.—Funds will be provided in 1983 to continue the development of systems to increase the capability of U.S. general purpose and theater nuclear forces, as well as to develop the capability to project forces rapidly wherever the vital interests of the U.S. are threatened.

- Army efforts include improvement programs for the M-1 tank, chemical defense equipment and chemical weapons, and various helicopter systems, and continued development of the Patriot anti-aircraft missile system.
- The Air Force is developing deep strike interdiction versions of F-15 and F-16 fighters, LANTIRN night/all weather navigation and targeting pods for tactical aircraft, and the AMRAAM advanced medium range air-to-air combat missile.
- The Navy is developing a lightweight anti-submarine torpedo, a new destroyer and a vertical launch system for missiles. Upgrades to current subsystems to improve detection, tracking and targeting will also increase the capability of major systems now in production.

Intelligence and Communications, Program Management and Support.—R. & D. on intelligence and communication systems will focus on communication satellites, on radios that will work in the electronic noise of the battlefield, and on battlefield surveillance radars. Work will also continue on the use of technology to reduce manufacturing costs and to extend the life and capability of existing defense systems.

NATO Cooperation.—Cooperation in research and development and joint production of new weapon systems will be pursued to exploit, fully, Alliance resources. Funding for these activities is not identified separately in table K-5 but is included in the other categories discussed above.

Table K-5 provides the details of the Department of Defense military R. & D. funding.

Table K-5. **DEPARTMENT OF DEFENSE—MILITARY RESEARCH AND DEVELOPMENT**

(In millions of dollars)

Type of activity	1981 actual	1982 estimate	1983 estimate
OBLIGATIONS			
Conduct of R. & D.:			
Research, development, test and evaluation:			
Technology base	2,570	2,849	3,288
Advanced technology development	578	736	928
Strategic programs	3,187	4,802	6,520
Tactical programs	5,914	7,029	7,524
Intelligence and communications	1,565	2,167	2,675
Program management and support	2,096	2,289	2,849
Other appropriations	585	681	685
Total conduct of R. & D.	16,494	20,553	24,469
Total conduct of basic research, included above	(603)	(673)	(781)
R. & D. facilities	278	285	366
Total obligations	**16,772**	**20,838**	**24,835**
OUTLAYS			
Conduct of R. & D.	15,720	18,784	22,673
R. & D. facilities	238	248	320
Total outlays	**15,958**	**19,032**	**22,993**

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Through the programs of NASA, the Federal Government makes investments in R. & D. that yield new space technologies to improve the national security and the long-term scientific and technological strength of the Nation. They also provide new knowledge about the earth, the solar system, and the universe.

In 1983, the R. & D. request would continue flight missions launched in prior years (e.g., Voyagers to the outer planets) and further development of most major ongoing projects, including the Space Shuttle. Obligations for the conduct of R. & D. would increase by $672 million in 1983 to a total of $6.5 billion. Within this amount, basic research would amount to $682 million, an increase of $102 million over 1982. Obligations for construction of facilities in 1983 would total $116 million.

Space Transportation.—Shuttle development, testing and procurement of a fleet of four orbiters will continue in the space transportation systems program. The Space Shuttle is essential to exploit space effectively and will help maintain U.S. leadership in space throughout this century. It will allow retrieval, repair and service of satellites in space and the operation of space laboratories, such as the European-built Spacelab, for scientific and technology applications. Because it is reusable, the Shuttle has the potential to reduce the cost of space missions.

The Shuttle is expected to operate on a routine basis in 1983 to meet the needs of domestic and foreign users, who have already made significant investments in anticipation of its availability in the early 1980s. Also, regular Shuttle operations are important to meet civilian and national security commitments in a timely manner at the lowest total cost to the Nation. While the Shuttle is expected to replace most expendable launch vehicles, the budget continues efforts to assure adequate expendable vehicle capacity until the Shuttle becomes fully operational.

With the second successful launch of the Space Shuttle orbiter, Columbia, the U.S. clearly demonstrated that a manned reusable space vehicle is feasible. The 1983 budget provides the funds needed to make possible a timely and effective operational Shuttle system. Included are funds to:

- Demonstrate the ability to use the Shuttle for repairing a damaged satellite while in orbit;
- Enhance the payload lift performance of the Shuttle, providing users with additional assurance that its full planned capabilities will be available to both civil and national security users.
- Continue procurement of the second Spacelab (with an initial flight of the first Spacelab planned for mid-1983) and continue to develop and procure an upper stage for use with the Shuttle for high-Earth orbit and for interplanetary missions. The Shuttle will be operated from the Kennedy Space Center in Florida and from the Vandenberg Air Force Base in California.

Space Science.—In this area, in-flight projects are conducting deep space astronomy while in orbit and others are exploring the solar system. Most of these spacecraft will continue their flight missions and will gather scientific data well beyond 1983.

- The Solar Maximum Mission, launched in 1980, will continue operations and data analysis activities.
- Two Voyager spacecraft, launched in 1977, have successfully encountered Jupiter and Saturn, and Voyager 2 will continue on its way to Uranus.

- The flight of several other scientific satellites (e.g., International Ultraviolet Explorer) will be extended.

The 1983 budget supports continuation of the flight of these satellites in space and analysis of scientific data sent back to Earth. It also provides for the retrieval and repair in orbit of the partially disabled Solar Maximum Mission Satellite.

The proposed budget continues development of major flight projects to be launched in the future.

- The Space Telescope is planned for launch in 1985 and will serve as a major astronomy facility for a 15- to 20-year period.
- The Gamma Ray Observatory is planned for launch in 1988 and will enhance basic research in high energy astrophysics, providing new knowledge about objects in deep space.
- Spacelab astronomy experiments, designed for repeated use, will be conducted on the Shuttle to improve our understanding of the Sun and the universe from Earth orbit.
- Work is continuing on the Galileo mission to Jupiter; the spacecraft is composed of two segments—an orbiter and a probe to enter the upper atmosphere of Jupiter. The Galileo orbiter and probe will be launched in 1985 and will arrive at Jupiter in 1989 to carry out long-term studies of the giant planet, its satellites, and its magnetosphere.
- Experiments will be conducted using several smaller Explorer satellites, balloons, aircraft, and sounding rockets.

Space and Terrestrial Applications.—The 1983 budget continues to support research that could lead to the broad application of space technology to national needs. The 1983 budget requests continued funding for relatively fundamental and long-term research activities to:

- Improve understanding of Earth resources, climate, weather, and pollution;
- Develop agriculture forecasting techniques based on satellite data;
- Advance knowledge in materials science through low gravity experiments; and
- Extend the capability for satellite communications at higher frequencies than those employed with current satellites.

Development of the fourth and fifth in the series of land remote sensing satellites is continuing with launches scheduled for 1982 and 1985. With the completion of Landsat development activities by NASA in 1983, the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce will assume responsibility for an operational satellite data system based on the Landsat-D series of satellites. Space remote-sensing technology, such as that employed by Landsat-D, has the potential to improve our ability to manage critical Earth resources.

The climate-observing satellite program, designed to provide global measurements of the Earth's radiation, is being continued. The mission is an important part of the national effort aimed at providing a better understanding of the Earth's climate.

In addition, NASA is developing ways to use the Spacelab (to be flown in the Shuttle) for materials processing and other applications.

Aeronautical Research and Technology Programs.—In 1983, support will be focused on fundamental research in all basic aeronautical disciplines, the maintenance of specialized facilities for research and testing, and technology development and demonstration activities critical to the Nation's defense needs.

Research emphasis will be placed on:

- Aerodynamics, propulsion and avionics;
- Flight controls and human-vehicle interaction; and
- Materials and structures.

Technology development and demonstration projects with relatively near term commercial applications will be curtailed as an inappropriate Federal subsidy.

Agency-wide Support Activities.—Obligations for agency-wide support activities will increase by $168 million in 1983 to $1.9 billion. These programs include, primarily, satellite tracking and data acquisition support, all NASA civil service and administrative costs, construction and maintenance of the agency's R. & D. facilities, and R. & D. addressing fundamental space technology problems and opportunities common to a broad spectrum of space programs. For 1983, the increased obligations are needed primarily to initiate lease payments for the new Tracking and Data Relay Satellite System.

Table K-6 provides the details of NASA's R. & D. funding.

DEPARTMENT OF COMMERCE

In 1983, the scope of the Department of Commerce R. & D. activities will expand significantly as a result of the proposed dismantlement of the Department of Energy and the transfer of its R. & D. programs to the Department of Commerce, where they will be administered by the new Energy Research and Technology Administration (ERTA).

R. & D. support for the ongoing R. & D. programs of the Department is provided primarily through the National Bureau of Standards (NBS), and the National Oceanic and Atmospheric Administration (NOAA).

Total obligations for the conduct of R. & D. will decrease from $4.8 billion in 1982 to $4.2 billion in 1983. The Department's activities by area are summarized below.

Table K–6. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION—RESEARCH AND DEVELOPMENT

(In millions of dollars)

Type of activity	1981 actual	1982 estimate	1983 estimate
OBLIGATIONS			
Conduct of R. & D.:			
Space transportation systems	2,729	3,090	3,468
Space science	542	568	682
Space and terrestrial applications	340	334	320
Aeronautical research and technology	271	233	232
Space research and technology	111	111	123
Energy technology	2	—	—
Tracking and data acquisition	341	402	509
Research and program management	1,071	1,103	1,179
Total conduct of R. & D.	5,407	5,841	6,513
Total conduct of basic research, included above	(532)	(580)	(682)
R. & D. facilities	114	143	116
Total, obligations	**5,520**	**5,984**	**6,629**
OUTLAYS			
Conduct of R. & D.	5,279	5,696	6,460
R. & D. facilities	147	135	122
Total, outlays	**5,426**	**5,831**	**6,582**

Energy Research and Technology Administration (ERTA).—Support will be provided by ERTA for a substantial R. & D. program related to the development and testing of nuclear weapons; a general science program comprised largely of basic research in high energy physics and nuclear sciences; and a broad energy research program focused on long-term R. & D.

Obligations for the conduct of research and development at ERTA will total $3.9 billion in 1983, a reduction of $604 million from 1982. Obligations for R. & D. facilities will total $678 million in 1983, $277 million below 1982. These decreases for energy R. & D., particularly the decrease for R. & D. facilities, reflect the proposed curtailment of Federal support for major demonstration projects (e.g., in fossil and solar energy conversion) consistent with the Administration policy that such projects are more appropriately the responsibility of the private sector. ERTA programs by major area are highlighted below.

The national defense program of ERTA supports the continued development and production of new nuclear weapons. This program also supports the development of improved technologies for monitoring nuclear weapons treaties and of improved methods for safeguarding nuclear materials. Efforts will be continued to develop improved technologies and methods for the safe storage and disposal of radioactive wastes produced by the national defense

programs and to develop improved propulsion reactors for naval vessels.

Obligations for these activities are proposed to increase from $1.5 billion in 1982 to $1.7 billion in 1983 for the conduct of R. & D. to assure an effective long-term nuclear weapons program. Obligations for R. & D. facilities in this area will be $336 million in 1983, a decrease of $60 million below 1982.

The general science and research program of ERTA primarily supports research in high energy and nuclear physics. An increase of $56 million to $483 million in 1983 for the conduct of R. & D. will allow continued emphasis on advanced accelerator concepts and efforts to understand the fundamental nature and constituents of matter at about the 1981 level of effort. Life sciences research and research on nuclear medicine applications, also supported as part of the general science program, are continued at a reduced level. In addition, $117 million will be obligated in 1983 for R. & D. facilities in this area, approximately the same level as 1982.

Because of the exceptional research opportunities in high energy physics and the demonstrated excellence of the U.S. program, the administration is committed to maintaining a strong national effort in this field. The 1983 budget request of $429 million for the conduct of R. & D. and related facilities in this field represents a $65 million increase over 1982. This would provide for an increased level of utilization of existing research facilities, expeditious completion of the Energy Saver and TEVATRON I and II projects at Fermilab, research and development work at the Stanford Linear Accelerator Center leading to the planned Stanford Linear Collider project, and accelerator research and development on improved components and novel concepts. A principal thrust in this field will be accelerator R. & D. efforts at the Brookhaven National Laboratory, related to a future high energy physics accelerator project. Any decision to proceed with this project will be based on overall scientific potential and budget considerations.

The energy program of ERTA includes a broad program of support in the basic energy sciences and other long-term research to provide a scientific underpinning for advancements in energy technology by Government and industry. It also includes support for the development of selected energy technologies of a high risk but potentially high pay-off nature, such as magnetic fusion, where significant private investment is unlikely at this time.

Obligations for the conduct of energy R. & D. are proposed to decrease from $2.6 billion in 1982 to $1.8 billion in 1983. Obligations for R. & D. facilities in this area will be $224 million in 1983, a decrease of $216 million below 1982.

In the basic energy sciences, funding for the conduct of R. & D. and related facilities will be increased by $40 million to $284 mil-

lion in 1983 for long-term research in such fields as nuclear science, chemistry, engineering, materials science, mathematics, biology, and geoscience. Such support is intended to strengthen the scientific and technical base for future advances in all energy technologies. In addition, emphasis will be given to providing support for the operation of several unique national user facilities, which the basic energy science program manages (e.g., the National Synchrotron Light Source at the Brookhaven National Laboratory). In 1983, the basic energy science program, for the first time, will assume full responsibility for the Stanford Synchrotron Radiation Laboratory. This facility was previously funded by the National Science Foundation.

The 1983 budget will continue the redirection of the non-nuclear R. & D. programs to emphasize long-term generic research and place greater reliance on the private sector for technology development. Obligations for the conduct of R. & D. in fossil, solar, biomass and other renewable energy sources are expected to be $315 million in 1983, down from $814 million in 1982, with an additional reduction of $95 million for demonstration projects included under support for R. & D. facilities. The budget provides $107 million for the conduct of fossil related R. & D. and associated facilities which strengthen the scientific base, in such areas as catalysis, kinetics, waste characterization, flame research and coal structure. Funding at the level of $90 million will be provided for research in support of solar energy and energy conservation.

The 1983 budget provides for a broad nuclear program of fission and fusion R. & D. The breeder reactor program will be funded at $577 million in 1983, maintaining a priority on the design and construction of the Clinch River Breeder Reactor (CRBR). In addition, long-range research will continue in support of breeder technology. Total funding for breeder R. & D. will decrease by $108 million from 1982, through curtailment of technology development in support of the follow-on Large Developmental Plant (LDP) and through phase-out of the Light Water Breeder Reactor demonstration.

In other fission R. & D., there will be a focus on safety and waste management research. The Department, in cooperation with the Nuclear Regulatory Commission, will conduct technical investigations associated with the disabled Three Mile Island (TMI) plant. This will permit a better understanding of accidents such as the occurrence at Three Mile Island and will help to prevent them in the future. The disabled TMI plant will serve as a source of useful data to aid this research. The budget includes $205 million in 1983 for the conduct of other fission R. & D., a reduction of $47 million below 1982.

The budget request for fusion R. & D. and related facilities in 1983 of $444 million is a decrease of $10 million from the 1982 level. This change consists of an increase of $66 million in the operating budget offset by a decrease of $76 million in capital equipment and construction. The increase in the operating component of the budget is based on the goal of resolving key outstanding physics and technology issues before continuing the pace of construction of new large facilities.

Finally, the energy R. & D. program of ERTA includes research on the environmental effects of energy production and use which will continue at about the same level of effort as 1982 with emphasis on determining the health effects of radiation and generic research related to synthetic fuels technology. Funding also will continue for research to determine the relationship between the CO_2 content of the atmospheric and the Earth's climate changes.

National Oceanic and Atmospheric Administration (NOAA).—NOAA will continue research programs in the development of systems and components in such areas as mapping and charting; ocean research; conservation, protection and management of endangered and threatened species in the Nation's fisheries resources; forecasting, detection and tracking of weather systems and violent storms; and air pollution. Obligations for the conduct of R.& D. by NOAA in 1983 will decrease slightly from $159 million to $152 million.

National Bureau of Standards (NBS).—R. & D. efforts for NBS are organized into four programs: measurement research and standards; engineering measurement and standards; computer sciences and technology; and central technical support.

In 1983, NBS is expected to obligate $76 million for the conduct of R. & D. This is an $11 million decrease from 1982. Most of this decrease is related to the transfer of the governmentwide ADP standards program to the General Services Administration. In addition, there will be selected reductions in activities that are more appropriate for private sector funding (e.g., automated manufacturing) and increases for basic research activities needed to improve measurement techniques and standards.

Other Commerce R. & D. Activities.—The Bureau of the Census, the Patent and Trademark Office, and the National Telecommunications and Information Administration also maintain smaller research and development programs. R. & D. funding for these areas in 1983 would be $12 million.

Table K-7 provides the details of the R. & D. funding by the Department of Commerce.

Table K–7. DEPARTMENT OF COMMERCE—RESEARCH AND DEVELOPMENT

(In millions of dollars)

Type of activity	1981 actual	1982 estimate	1983 estimate
OBLIGATIONS			
Conduct of R. & D.:			
Energy Research and Technology Administration [1]	4,948	4,522	3,917
National defense	(1,347)	(1,504)	(1,684)
General sciences	(395)	(427)	(483)
Energy research	(3,206)	(2,590)	(1,750)
National Oceanic and Atmospheric Administration	201	159	152
National Bureau of Standards	83	88	76
Other department activities	44	24	12
Total conduct of R. & D	5,276	4,793	4,157
Total conduct of basic research, included above	(608)	(665)	(762)
R. & D. facilities:			
Energy Research and Technology Administration	981	955	678
National defense	(319)	(396)	(336)
General sciences	(126)	(119)	(117)
Energy research	(536)	(440)	(224)
National Oceanic and Atmospheric Administration	1	0	0
National Bureau of Standards	0	9	3
Total R. & D. facilities	982	964	681
Total obligations	**6,258**	**5,757**	**4,838**
OUTLAYS			
Conduct of R. & D	5,466	5,240	4,352
R. & D. facilities	1,112	1,191	644
Total, outlays	**6,578**	**6,431**	**4,995**

[1] Formerly, programs of the Department of Energy

DEPARTMENT OF HEALTH AND HUMAN SERVICES

The Department of Health and Human Services (HHS) obligations in 1983 for the conduct of R. & D. would increase by $150 million over the 1982 level to a total of $4.1 billion. Within this total, funding for basic research will increase by $69 million to $2.1 billion. Obligations for R. & D. facilities will total $20 million in 1983. This represents a substantial decline from the $62 million provided in 1982. However, it should be noted that the relatively higher level in 1982 was primarily due to the nonrecurring costs for a single large project—construction of new research headquarters for the Food and Drug Administration—for which $35 million was provided in 1982.

Health.—Over 85% of the Department's funds for the conduct of R. & D. and over 90% of the department's basic research funds are obligated by the National Institutes of Health (NIH) for biomedical research to advance the Nation's capabilities for the prevention, diagnosis, and treatment of disease. R. & D. programs in health-related research also are supported by several other agencies

within the Department. The 1983 budget will also provide for continuation of these health research efforts in the Alcohol, Drug Abuse, and Mental Health Administration, the Food and Drug Administration, the Centers for Disease Control, the Health Services Administration, the Health Care Financing Administration, and the Office of the Assistant Secretary for Health.

The *National Institutes of Health* would obligate $3.5 billion in 1983, an increase of $106 million above the 1982 level; over one-half or $1.9 billion of NIH's total 1983 R. & D. budget would support basic research. Among the most significant activities to be supported by NIH are:

- Basic research on fundamental life processes in health and disease;
- Clinical research designed to transfer and apply the results of basic science to intervention, including development and refinement of techniques, processes, methods, and practices;
- Cooperative clinical trials of new antiviral drugs against neonatal herpes, herpes encephalitis, herpes genitalis, and rhinoviruses;
- Basic and clinical research into the cause, cure, and prevention of diabetes;
- Targeted research in epidemiology and risk estimation; and
- Test development related to reproductive toxicology, fertility assessment, and neurological toxicology.

The *Alcohol, Drug Abuse and Mental Health Administration* would conduct studies of mental disease and neurological disorders, biomedical factors and health effects of drug abuse, and causes and consequences of alcohol abuse, with emphasis on strengthening prevention activities.

Specific research areas would include:

- the use of computerized imaging techniques for mapping metabolic processes of the human brain;
- the role of endorphins and enkephalins in addiction and substance abuse;
- the role of genetic factors in alcoholism; and the role of alcohol in fetal defects.

The *Food and Drug Administration* would support research relevant to its mission of regulating food, drugs, and biological and radiological products.

The *Centers for Disease Control* would continue studies on the epidemiology and control of communicable diseases and on health promotion and disease prevention.

Other Health Related Agencies within HHS would support research in areas such as treatment and control of Hansen's disease; survey methods and techniques for analysis of health statistics; and the organization, delivery, and financing of health services. This

support will be provided through programs of the Health Services Administration, the Office of the Assistant Secretary for Health and the Health Care Financing Administration.

Human Services.—The Department's obligations for R. & D. in human services programs in 1983 would be $100 million, $9 million above 1982. These funds would be devoted to research related to the missions of the Office of Human Development Services and the Social Security Administration and to policy research conducted on behalf of departmental management.

Table K–8 provides the details of the R. & D. funding of the Department of Health and Human Services.

Table K–8. **DEPARTMENT OF HEALTH AND HUMAN SERVICES—RESEARCH AND DEVELOPMENT**

(In millions of dollars)

Type of activity and organizational units	1981 actual	1982 estimate	1983 estimate
OBLIGATIONS			
Conduct of R. & D.:			
Health:			
National Institutes of Health	3,332	3,427	3,533
Alcohol, Drug Abuse, and Mental Health Administration	286	256	289
Food and Drug Administration	71	73	75
Centers for Disease Control	74	68	74
Health Resources Administration	5	2	.....
Health Care Financing Administration	39	30	30
Office of Assistant Secretary for Health	35	20	20
Health Services Administration	19	3	1
Special Foreign Currency Program	1	2	1
Subtotal, Health	3,862	3,881	4,023
Human Services:			
Office of Human Development Services	70	56	59
Social Security Administration	23	21	25
Departmental Management	20	13	15
Subtotal, Human Services	112	91	100
Total conduct of R. & D.	3,973	3,972	4,122
Total conduct of basic research, included above	(1,955)	(2,000)	(2,069)
R. & D. facilities	25	62	20
Total obligations	**3,999**	**4,034**	**4,142**
OUTLAYS			
Conduct of R. & D.	3,991	3,935	4,039
R. & D. facilities	43	35	38
Total outlays	**4,034**	**3,971**	**4,078**

NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) primarily supports basic research in all scientific disciplines through grants, largely to scientists and engineers in academic institutions. The Foundation's support is of particular significance because it complements the

basic research programs of mission agencies, such as the Department of Defense and the National Institutes of Health, and helps to balance Federal support across all fields of science and engineering.

NSF obligations for the conduct of R. & D. would increase from $961 million in 1982 to $1,033 million in 1983, an increase of $72 million above 1982. In addition, $16 million will be obligated for research facilities and major equipment in 1983, $6 million above the 1982 level. Funding for basic research programs would increase from $912 million in 1982 to $984 million in 1983.

These increases will allow primarily for cost increases due to inflation in research project support, partially offset by reductions in some lower priority activities. Specifically, the 1983 budget would:

- Provide an increase over 1982 in the support by NSF of research in the natural sciences and engineering that would more than offset the estimated cost increases due to inflation.
- Emphasize support of the mathematical and physical sciences (particularly computer sciences), engineering and the earth sciences largely because of the importance of these disciplines to the long-term technological advancement and economic strength of the Nation.
- Continue support of U.S. activities in the Antarctic—managed by the NSF—at approximately the ongoing level of effort. This support is continued because of the importance of the Antarctic as an area where a number of nations conduct valuable scientific research in peaceful coexistence under the terms of the Antarctic Treaty, of which the U.S. is a signatory.
- Continue NSF's research fellowship program, as a complement to the Foundation support of research. However, other lower priority science education activities previously supported by the NSF would be phased out in 1983.
- Provide increases in 1982 and 1983 over the previously reduced level of the administration's 1982 (March) budget for the social, behavioral and economic sciences to allow continued funding for relatively higher priority areas. Examples include maintenance of long-term data bases, methodological improvements and quantitative research which are important to the continued development of these disciplines as fields of scientific inquiry.
- Emphasize, within the funds provided for the conduct of research, support for upgrading research instrumentation.

DEPARTMENT OF AGRICULTURE

The Department of Agriculture supports research and development in several disciplines related to agriculture and forestry.

Obligations of the Department for the conduct of research and development are estimated to total $838 million in 1983, compared to $807 million in 1982, an increase of $31 million.

The Department's 1983 budget is highlighted below by agency:

The Agricultural Research Service would obligate $454 million for research on protection of plants and animals against diseases and pests, and on the conservation, use and improvement of soil, water and air resources.

The Cooperative State Research Service would obligate $223 million to maintain support of the cooperative program with the land-grant institutions and to expand the competitive grants for basic plant research.

In addition, $9 million would be provided to initiate a 5-year, $50 million, facilities improvement program for the 1890 Colleges and the Tuskegee Institute.

The Forest Service would obligate $98 million to improve knowledge needed to manage and protect forest and related rangeland resources to meet demands for their use. Research will be conducted on: genetics, silviculture and timber management, watershed management, range and fish habitats, protection for forest resources from fire and forest pests, surface environment and mining, forest engineering and utilization, and economics of forest commodity production, processing and distribution.

In addition, $62 million would be obligated for other areas, such as economic research, international cooperation and development, agricultural marketing, transportation of commodities, statistical reporting, and agricultural cooperatives.

DEPARTMENT OF THE INTERIOR

The Department of the Interior's R. & D. activities derive from a broad range of responsibilities, ranging from encouraging wise development of the Nation's energy and nonenergy mineral, water, land, and recreation resources to managing those resources on the public lands in the public interest.

Obligations for the conduct of R. & D. for the Department of Interior for 1983 are estimated at $371 million. This represents a decrease of approximately $27 million from the 1982 level, primarily in areas of geological hazards, and mining development and demonstrations.

The Department's research objectives for 1983 are highlighted below by major organization.

The Bureau of Land Management and *The Bureau of Reclamation* would continue programs in watershed conservation and devel-

opment, timber and range forage production, wildlife habitat, water resources planning and research, and dam safety.

The Fish and Wildlife Service would emphasize R. & D. activities which:

- Improve the quality of habitats and the availability of fish and wildlife; and
- Contribute to population control methods and preserve endangered species of fish and wildlife.

The National Park Service would emphasize research in archeology and the natural and social sciences.

In energy and minerals R. & D., a small overall reduction in effort is proposed. Decreases are proposed in the Geological Survey and the Bureau of Mines, with a small increase for the Office of Surface Mining.

The Geological Survey research priorities would include:

- Developing accurate appraisal and exploration techniques to determine mineral resources;
- Developing basic data on geological principles and processes;
- Understanding the ways to appraise and evaluate our water resources; and
- Improving uses of satellite acquired data in Earth and marine sciences.

The Bureau of Mines would stress:

- Health and safety in mines and processing plants;
- Helping the Nation become less dependent on foreign minerals; and
- Protection of the environment during mineral extraction.

The Office of Surface Mining research plans involve studies dealing with regulations compliance, monitoring of coal mining operations and ecological investigations.

DEPARTMENT OF TRANSPORTATION

The Department of Transportation's R. & D. program is oriented toward providing the information and new technology needed for its own operational (e.g., air traffic control) and regulatory (e.g., automotive safety standards) programs. Obligations for the conduct of research and development by the Department are estimated at $366 million for 1983, an increase of $37 million over 1982. The Department's 1983 budget is highlighted below by agency.

The Federal Aviation Administration (FAA) is expected to obligate $152 million in 1983. The proposed 1983 R. & D. obigations for FAA represent an increase over 1982 of $46 million. This increase will allow greater emphasis on engineering work on the national air traffic control system, and on emerging technology to improve collision avoidance systems and enhance enroute and terminal air traffic control systems.

The National Highway Traffic Safety Administration would obligate $59 million for motor vehicle research, traffic safety research and demonstrations, and other statistical and analytical studies. An increase is proposed in 1983 for continuing the National Accident Sampling system which provides nationally representative accident and injury data, and for focusing analysis on major traffic accidents.

The Urban Mass Transportation Administration plans to obligate $44 million to assist in the development of improved mass transportation systems, equipment and procedures. Emphasis will be placed on assisting existing proven transit systems.

The Federal Highway Administration would obligate $43 million to continue research programs in highway planning, design, construction, and maintenance to insure an effective and efficient highway system. Research would also be conducted in identifying, and correcting impediments to highway safety and on improving common carrier safety.

The Federal Railroad Administration would obligate $20 million to continue its emphasis on safety research. A $16 million reduction in funding from the 1982 level would eliminate nearly all nonsafety research.

The Maritime Administration would obligate $18 million to improve the productivity and competitive posture of the U.S. maritime industries. Increased funds are provided to support icebreaking vessels in the Arctic for R. & D. and increased ship research.

The U.S. Coast Guard would obligate $15 million to support research to maintain and improve search and rescue systems, environmental protection, marine safety, and aids to navigation. The proposed 1983 figure represents a decrease of $3 million for R. & D. from the 1982 level.

The Research and Special Programs Administration would obligate $8 million to support emergency preparedness and mobilization efforts and to support the hazardous materials and pipeline safety regulatory programs.

The Office of the Secretary would obligate $8 million for broad-based policy research on domestic and international transportation issues of importance to the Nation.

ENVIRONMENTAL PROTECTION AGENCY

The Environmental Protection Agency (EPA) conducts research and development in support of the Agency's regulatory and enforcement mission to protect human health and the environment. The R. & D. request for 1983 reflects a focusing on the highest priority research areas. These areas emphasize the following themes:

- Benefit and risk assessment in support of Agency regulatory decisions and impact analysis activities;
- Scientific support and technology transfer activities to help develop and install cost-effective pollution control technologies; and
- Improved scientific quality through peer review, quality assurance guidelines, and specially designed information systems.

Total obligations for the conduct of R. & D. are estimated to decrease from $317 million in 1982 to $230 million in 1983. EPA's activities by area are highlighted below.

The air research program would be reduced from 1982 by $8 million to a level of $27 million in 1983. The research will evaluate and establish national ambient air quality standards, new source performance standards, and emission standards for hazardous air pollutants and mobile source pollutants. EPA research into health effects of air pollution will continue past efforts to assess actual human exposure. Research on the effects of diesel engine exhaust will be reduced, reflecting attainment of EPA's current information goals for 1982.

The water quality research program expects to obligate $13 million in 1983, a decrease of $15 million from the 1982 level. In the municipal wastewater program, activities that are more appropriately conducted by the private engineering community, such as design engineering, are being eliminated. All extramural research in the water quality program will be eliminated, shifting all future activities to in-house R. & D. labs. The engineering-related extramural research of the industrial wastewater program is being reduced, due to near completion of the effluent limitations effort.

The drinking water research program would decrease by $6 million to a level of $15 million in 1983. The program will continue to evaluate data on the incidence and health effects of contaminants, evaluate alternate disinfectant techniques, provide a national quality assurance program, and carry out research related to the problems of small systems. Research on the nature and movement of contamination in subsurface waters will be expanded.

The hazardous waste program would obligate $18 million in 1983, a decrease of $4 million below the 1982 level. This research will support the development of methods and protocols for the regulatory program involving assessing risks to human health and ensuring quality control. Research will continue on developing a better understanding of the various hazardous waste control technologies.

The pesticide research program would obligate $3 million, an increase of $1 million over 1982. The research program supports development of methods for measuring and assessing human exposure to pesticides and the ecological effects of pesticides, risk as-

sessments, and development of improved methods for detecting chemical and biological pesticides.

The radiation research program would decrease by $.5 million, to a level of $0.4 million in 1983. These reductions occur in lower priority research areas, such as nonionizing radiation, which are not directly related to statutory mandates.

The toxic substance program would total $14 million for 1983, a decrease of $6 million. Research will support the development of more effective techniques, models and data bases to predict health effects of new chemicals. Development of methodologies and models for defining exposure and risk will be continued.

The energy program, which includes activities related to the impact and regulation of fossil fuel combustion and synthetic fuels, is projected at a level of $36 millon in 1983, a decrease of $19 million below 1982. Emphasis will continue to be placed on assessing the health and environmental impacts of synthetic fuels, evaluating control technology options, and providing the regions and States with indirect technical expertise. The 1983 funding includes $12 million to support a major government-wide effort to assess the sources and effects of acid rain.

Superfund Research in 1983 shows a reduction of $6 million, to a level of $4 million. This reduction is a result of the fast start-up required to implement Superfund and the fact that much of the information needed for developing guidelines and protocols and for developing the required cleanup and safety manuals will be completed in 1982. Funds for this program are derived from the Hazardous Substance Response Trust Fund, as opposed to general revenues.

NUCLEAR REGULATORY COMMISSION

The Nuclear Regulatory Commission (NRC) performs research in civil uses of nuclear materials and facilities consistent with public health and safety, environmental quality, and national security. A major share of NRC's effort is devoted to research on the use of nuclear energy to generate electric power. Its research objective is to provide safety and analytical methods for assuring the quality of NRC's licensing procedures and regulatory work.

In 1983, NRC's obligations for the conduct of R. & D. are expected to decrease from $223 to $220 million. In 1983, key areas, such as accident evaluation and mitigation and systems and reliability analysis will be strengthened. Additionally, reactor safety research, principally on the Clinch River Fast Breeder Reactor, will be increased in 1983. The Loss of Fluid Test Facility experimental program is planned to be completed in 1982. Funding for loss-of-coolant accidents and transient research will, therefore, be reduced more than offsetting proposed increases.

AGENCY FOR INTERNATIONAL DEVELOPMENT

Research and development activities of the Agency for International Development (AID) consist mainly of applied research to solve specific problems associated with basic human needs development and social and economic research aimed at improving U.S. and host country understanding of the major obstacles to such development.

Programs in this area reflect the administration's recognition of the importance of R. & D. in addressing the development problems faced by the Third World.

Obligations of AID for the conduct of R. & D. are estimated at $186 million in 1983, an increase of $26 million over 1982.

Most of AID's 1983 R. & D. funds will be devoted to three critical problems: Food production, with an emphasis on affecting developing country efforts to overcome the growing food crisis; population growth, emphasizing methods of controlling increasing population growth rates in the developing countries; and energy supply, emphasizing renewable and nonconventional energy sources critical for development to proceed.

VETERANS ADMINISTRATION

The Veterans Administration (VA) conducts and administers medical, rehabilitative, and health services research. In 1983 this agency would obligate $145 million, an increase of $8 million over 1982, for the conduct of R. & D.

The VA intramural biomedical research program is designed to benefit patients through increased quality and effectiveness of health care delivery. Priorities for 1983 include special research on alcoholism, geriatrics and hypertension.

In rehabilitative research, the VA works to develop and test prosthetic, orthopedic, and adaptive equipment for improving the care and rehabilitation of disabled veterans, including amputees, paraplegics and the blind.

The health services research program supports projects at VA health care facilities to improve the delivery and accessibility of health services to veterans. The preventive health program begun last year will be continued in 1983.

FOUNDATION FOR EDUCATION ASSISTANCE

The proposed Foundation for Education Assistance will continue to support a variety of R. & D. activities in 1983. Included among those activities will be basic and applied educational research; the conduct of surveys, evaluations and experiments in the field of education; the funding of developmental and demonstration projects; the assessment of the performance of children and adults

in reading, mathematics, communication and citizenship skills; the collection, analyses and reporting of statistics and other data related to education; and the dissemination of information and findings. The Foundation expects, in 1983, to obligate a total of $76 million for the conduct of R. & D.

In addition to its general research and data gathering activities, the Foundation will carry out R. & D. activities related to the areas of vocational and adult education for the handicapped, education programs for persons with limited English proficiency, and development activities that provide technical support for the dissemination activities of the Foundation.

OTHER AGENCY PROGRAMS

An additional 15 agencies (listed in table K–2, footnote 1) would obligate an estimated $272 million in 1983, for the conduct of R. & D., a decrease of $7 million below the 1982 total. Obligations by these agencies amount to less than 1% of all federally funded programs in R. & D. The programs of these agencies, like those of other agencies discussed above, are closely related to the agencies' missions.

Among the agencies in this category that expect to increase their obligations for R. & D. in 1983 are the Smithsonian Institution, the Army Corps of Engineers, the Arms Control and Disarmament Agency, and the Federal Emergency Management Agency.

SUPPLEMENTARY INFORMATION

Table K–9 provides information on the long-term trends in Federal funding for the conduct of R. & D.

Table K–9. **TRENDS IN CONDUCT OF R. & D.**

(Obligations in billions of dollars)

Year	Defense [1]	All other	Total
1953	2.8	.3	3.1
1954	2.5	.3	2.9
1955	2.2	.4	2.5
1956	2.5	.5	3.0
1957	3.3	.6	3.9
1958	3.8	.8	4.6
1959	5.6	1.1	6.7
1960	6.1	1.5	7.6
1961	7.0	2.1	9.1
1962	7.2	3.1	10.3
1963	7.8	4.7	12.5
1964	7.8	6.4	14.2
1965	7.3	7.3	14.6
1966	7.5	7.8	15.3
1967	8.6	7.9	16.5
1968	8.3	7.6	15.9
1969	8.4	7.2	15.6
1970	8.0	7.3	15.3
1971	8.1	7.4	15.5
1972	8.9	7.6	16.5
1973	9.0	7.8	16.8
1974	9.0	8.4	17.4
1975	9.7	9.3	19.0
1976	10.4	10.4	20.8
1977	11.9	12.1	24.0
1978	12.6	13.8	26.4
1979	13.6	15.4	29.0
1980	15.1	16.6	31.7
1981	17.8	17.2	35.0
1982 (estimate)	22.1	16.8	38.8
1983 (estimate)	26.2	16.8	43.0

[1] Includes military-related R. & D. programs of the Departments of Defense and Commerce.